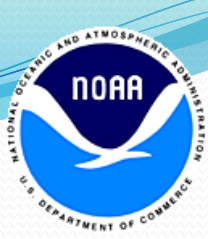




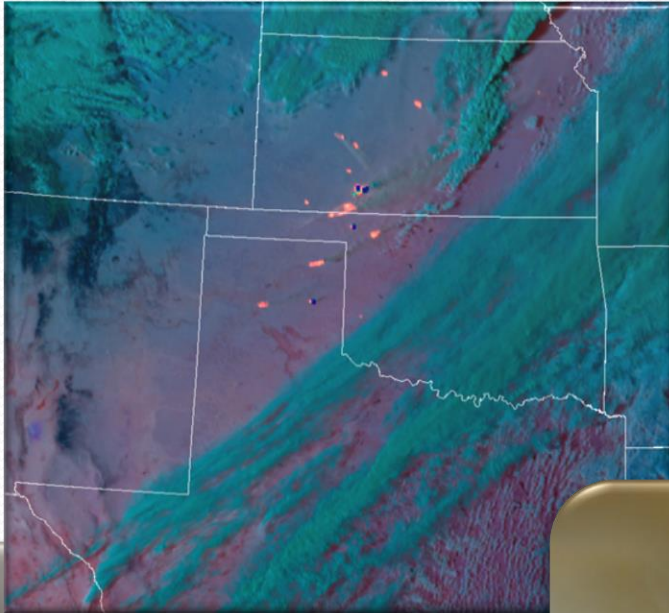
# Southern Great Plains Wildfire Outbreaks

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National Weather Service  
Amarillo, TX

NWS Amarillo Fire Weather Customer's Meeting  
January 30, 2018



# What are wildfire outbreaks?



- Southern Great Plains Wildfire Outbreaks are defined as follows:
  - At least 10 wildfires occur in the region, with all ignition starts on the same day.
  - At least 10,000 total acres are burned from the causative events.





# Wildland Fire Spectrum



Initial Attack  
<1 acre - 300 acres

Large Fires  
300 acres - 5,000 acres

Significant  
Wildfires  
5,000 acres

Megafires  
>100,000 acres

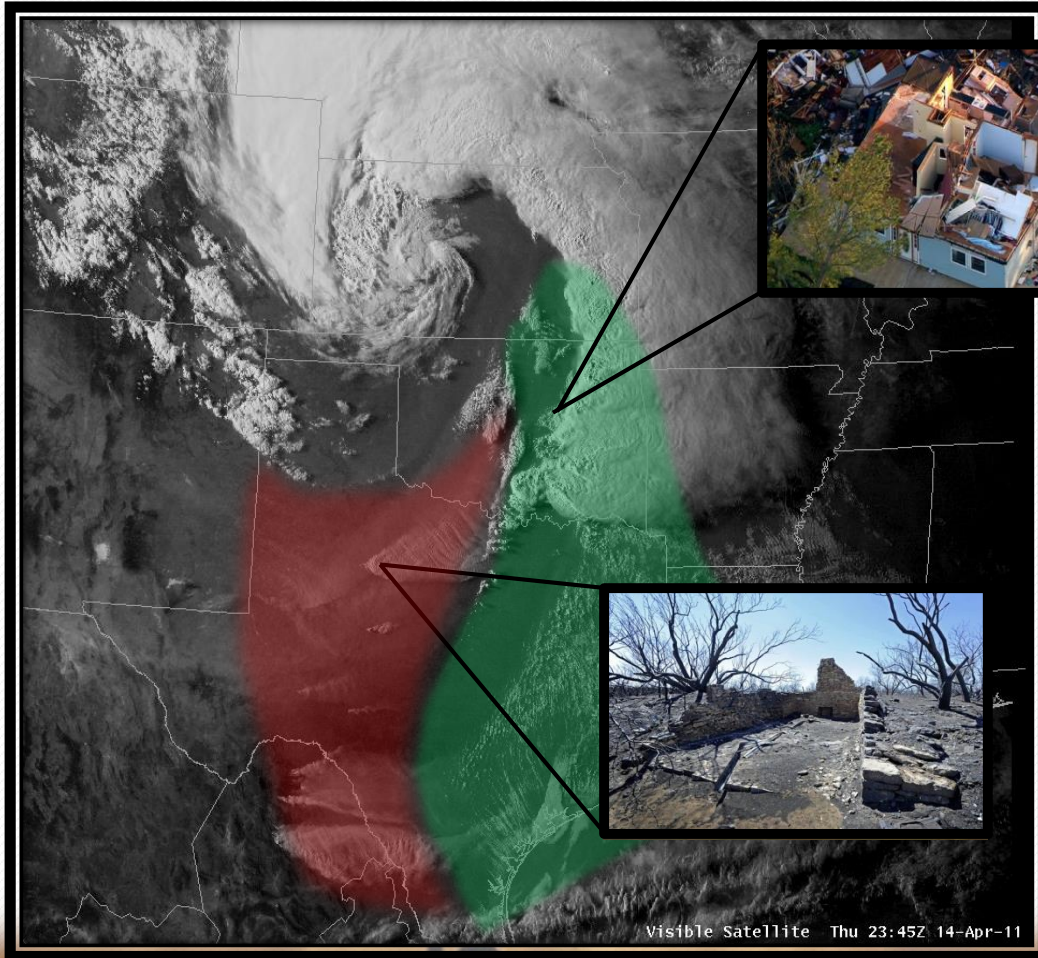
95%

4% <1%





# Weather Characteristics

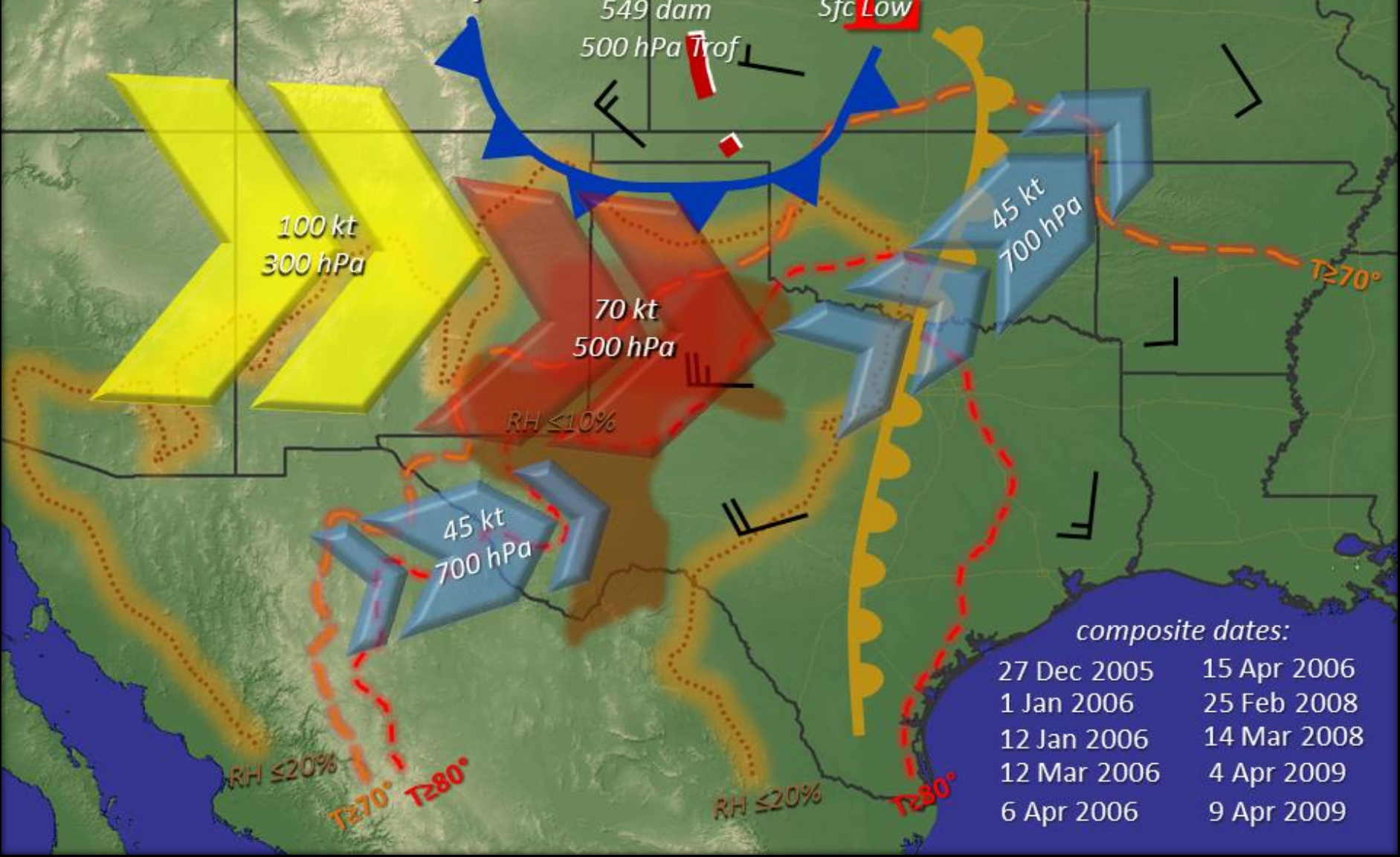


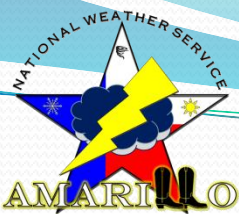
- Fire outbreak weather systems are similar to those that promote severe storms
  - Analogous methods useful in forecasting wildland fire
  - Fire damage is comparable to “violent” EF- rated storms
- “Fires are atmospheric events...which also organize heat release from the surface” - Pyne 2012**



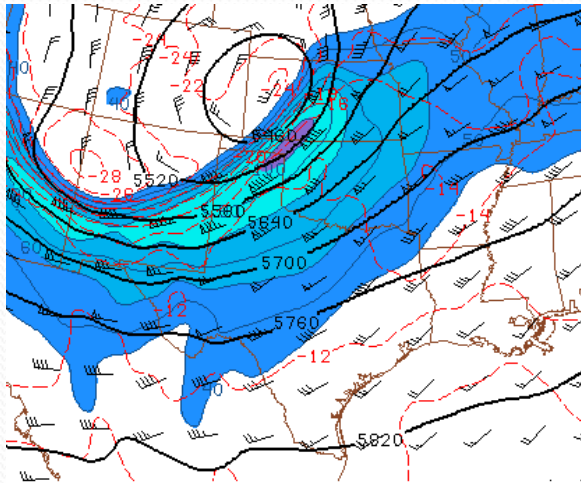
# Southern Great Plains Wildfire Outbreak Composite Map

based on 2100 UTC RUC analyses

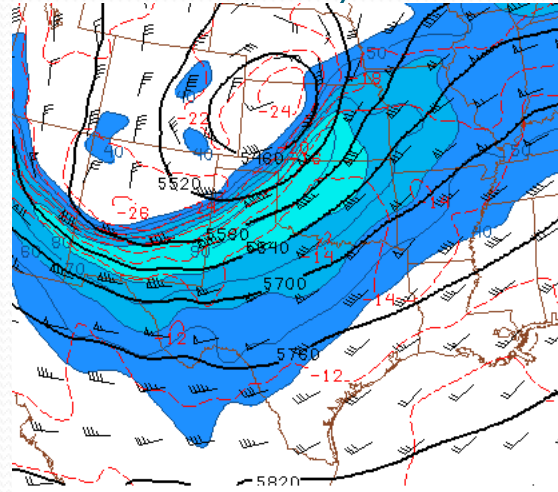




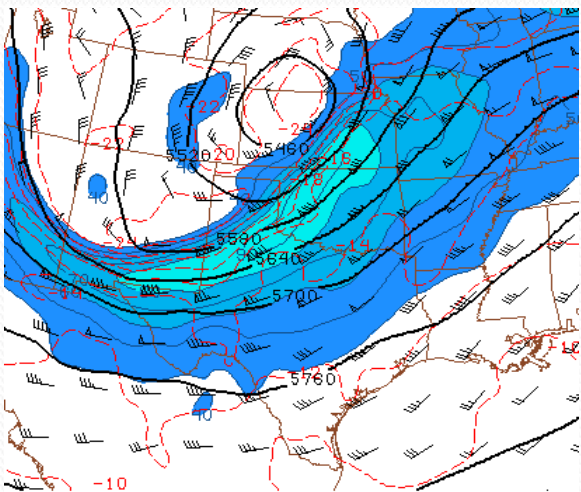
# March 23, 2016 500 mb Jet Analysis



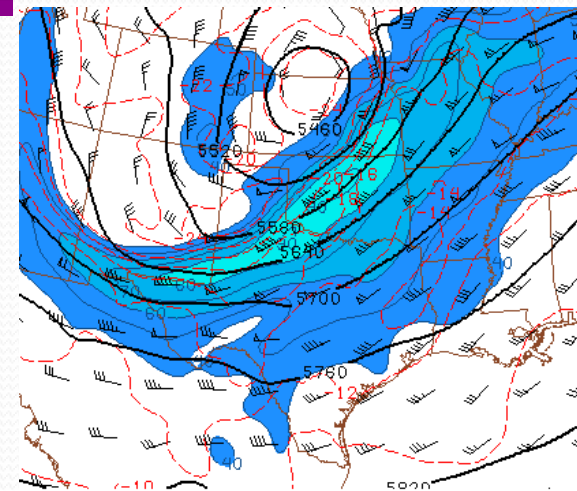
160323/1800V001 500mb hght/temp/wind



160323/2000V001 500mb hght/temp/wind



160323/2200V001 500mb hght/temp/wind



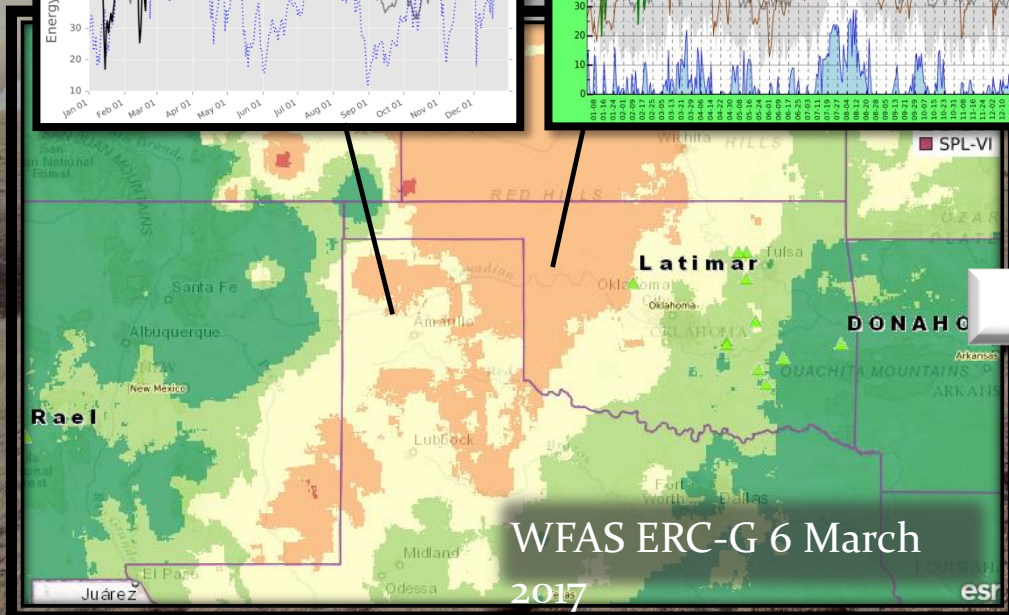
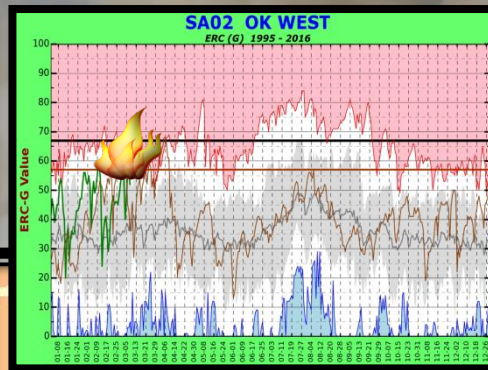
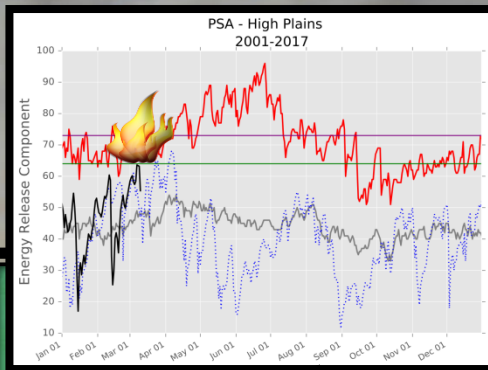
160324/0000V001 500mb hght/temp/wind

60 80 100 120 140

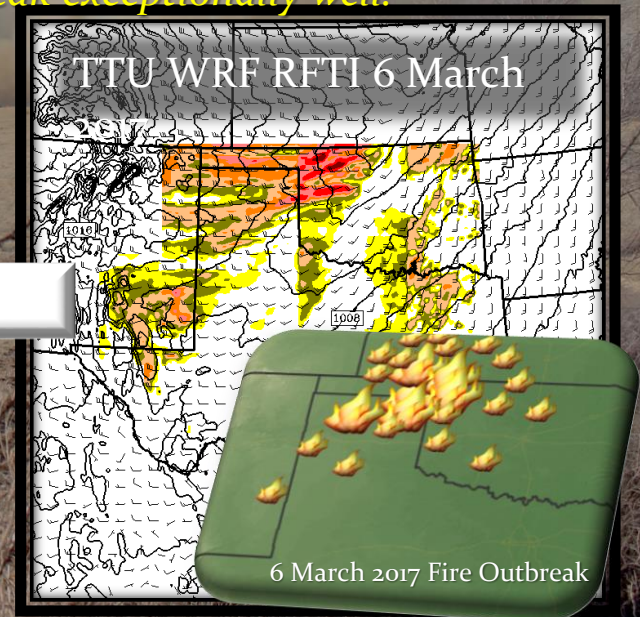


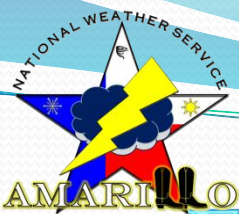
# ERC-G & RFTI

- The 6 March 2017 SGPWO occurred as ERC-G values peaked at 90<sup>th</sup> percentile values.
- The TTU WRF RFTI indicated “Extremely Critical” values of 7 & 8 over northwestern Oklahoma & the northeastern Texas Panhandle.

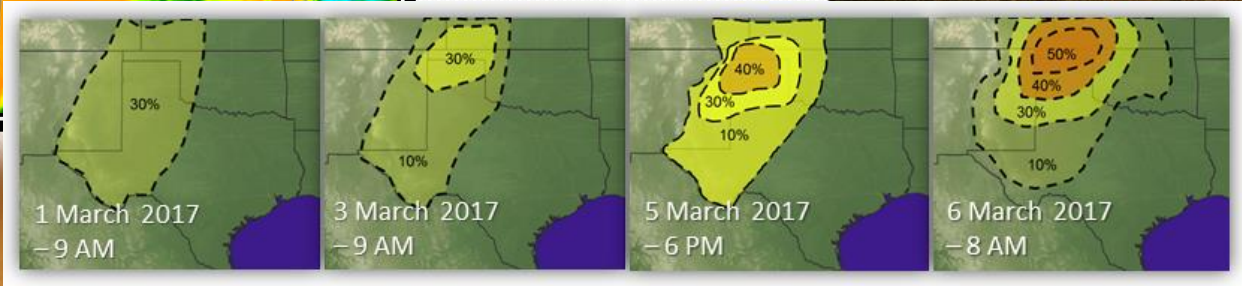
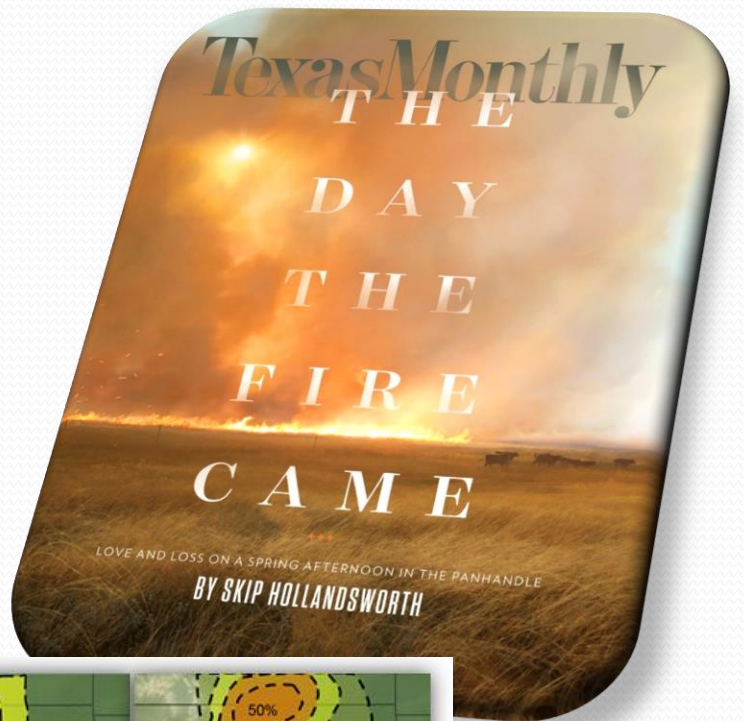
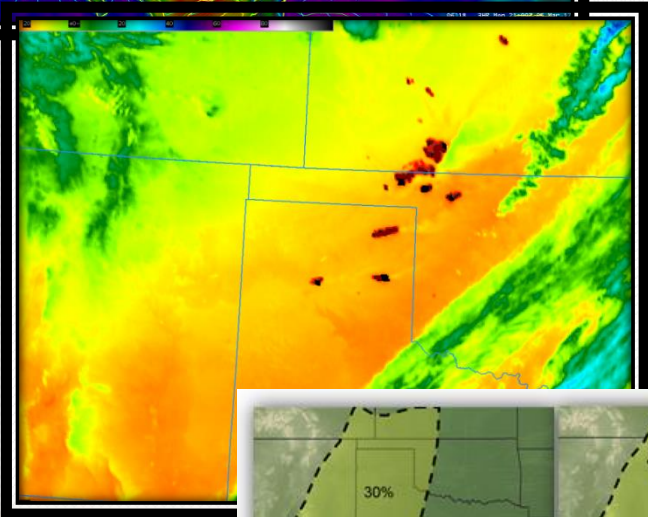
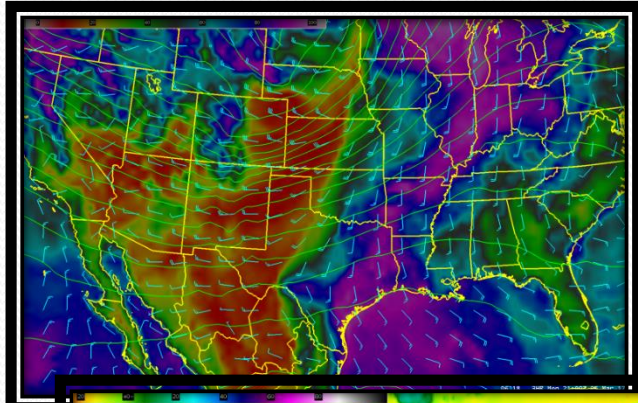


*A gridded composite of ERC-G & RFTI would appear to have skill in development of a “Significant Fire Parameter”. These fields (when combined) captured the 6 March 2017 outbreak exceptionally well.*

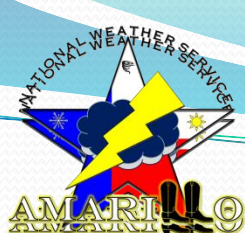




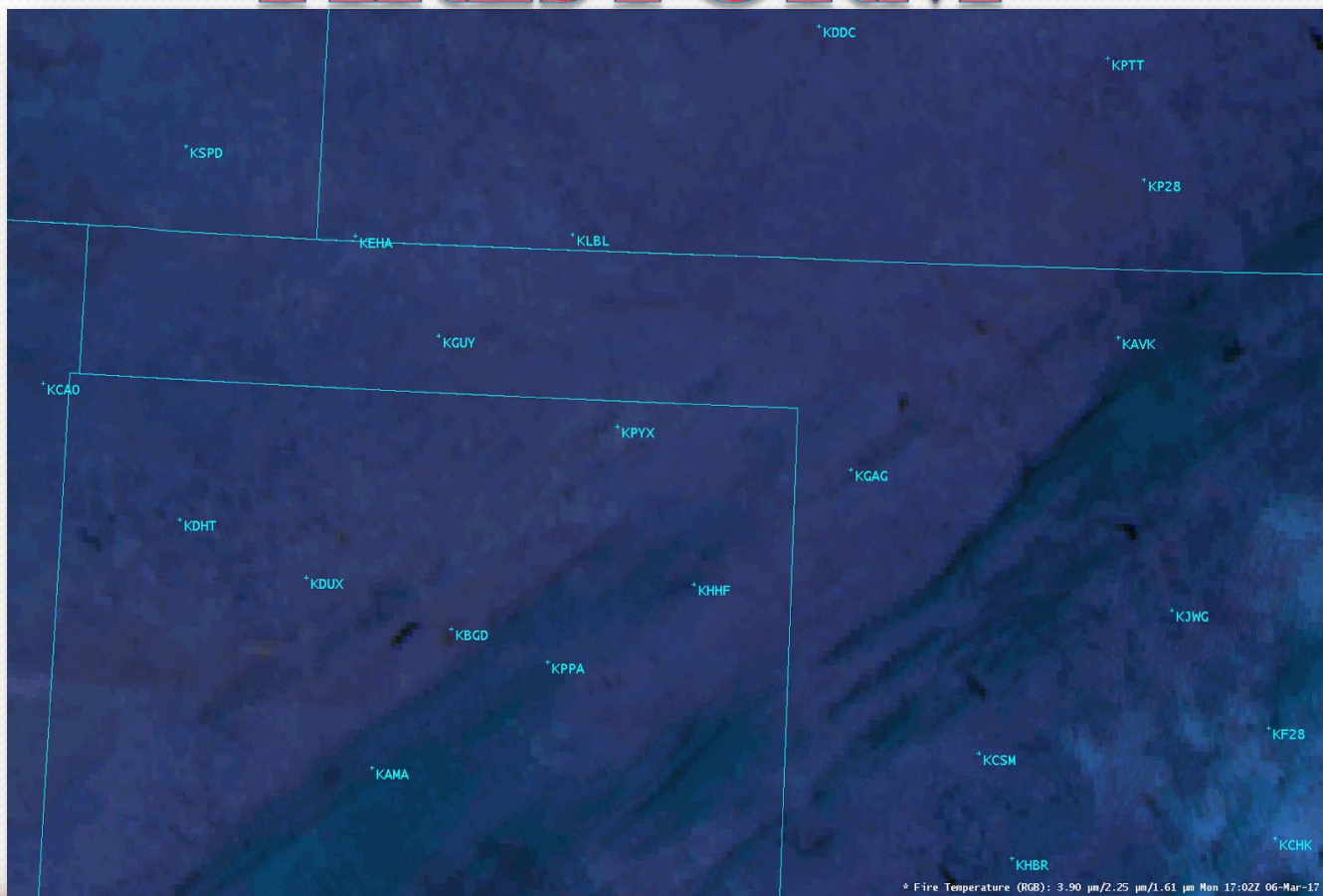
# Forecasting a FIRESTORM







# FIRESTORM



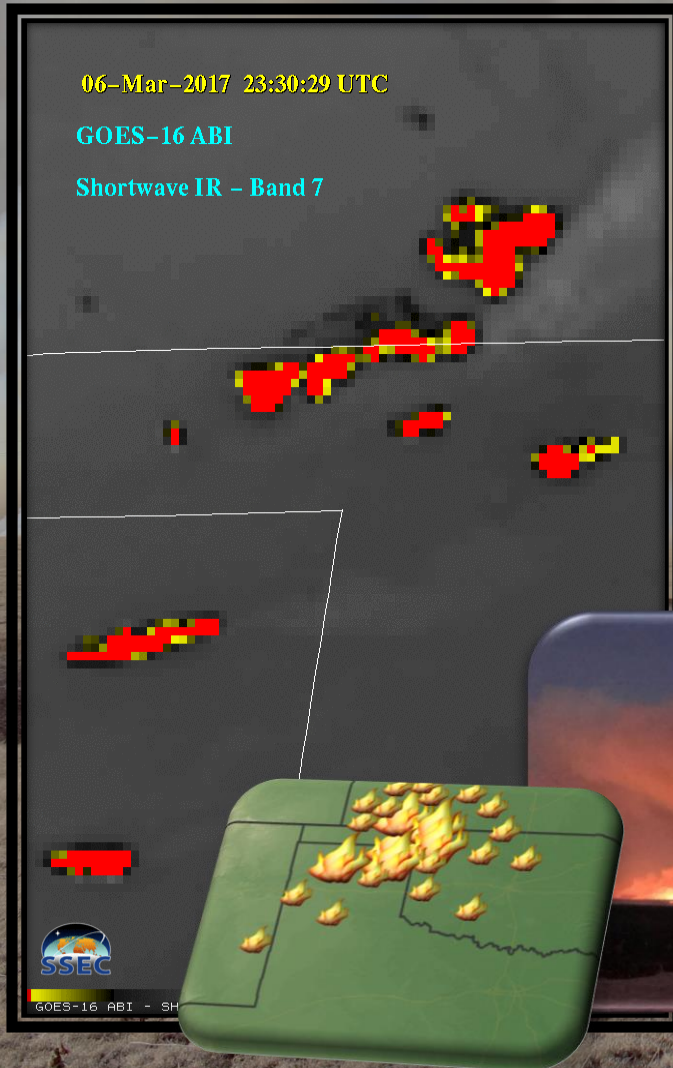
Recent Event: Unique characteristics of the 6 March 2017 Plains wildfire outbreak relative to historic context and recent science and operational training in grassland fire meteorology.

## Firestorm Summary

- 32 Major Fires
- 1,257,336 Acres Burned\*
- 87 Structures Destroyed
- 7 Dead, 5 Injured#

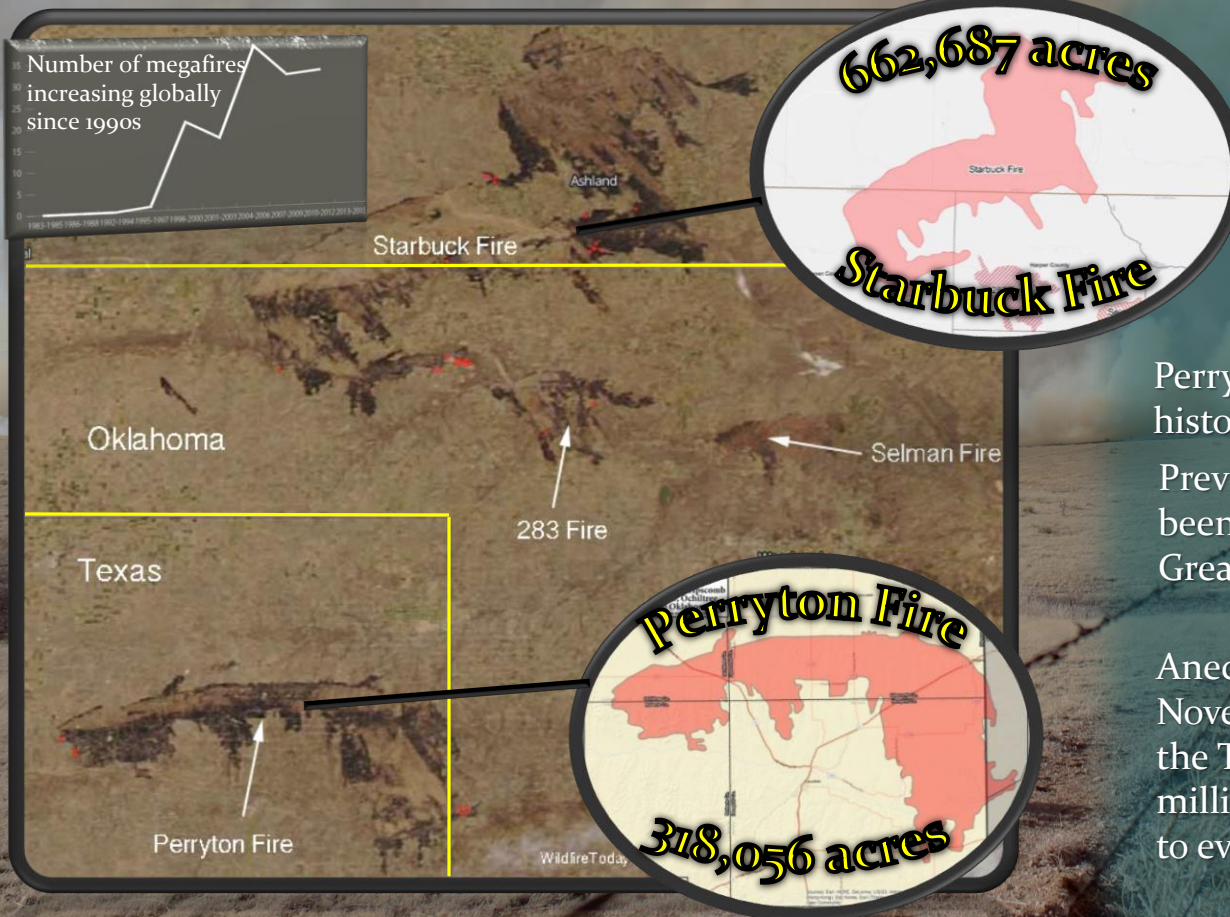
\* *Largest individual Plains fire outbreak documented in modern era*

# *Previous record Plains fire outbreak on 12 March 2006 (1.1 million acres) resulted in 12 fatalities.*



# MEGAFIRES

The occurrence of multiple megafires (>100,000 acres) was a remarkable characteristic of the 6 March 2017 fire outbreak.



*Additionally...the East Lefors Fire was a near-megafire at 92,571 acres.*

Starbuck Fire surpassed the 2015 Anderson Creek Fire for largest fire in Oklahoma/Kansas history.

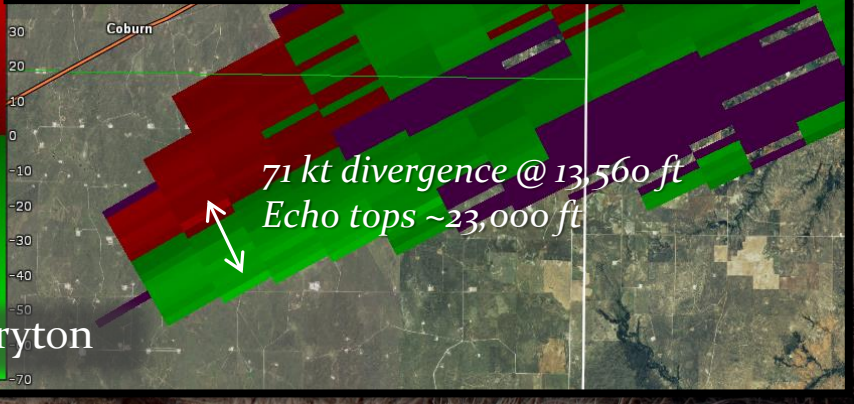
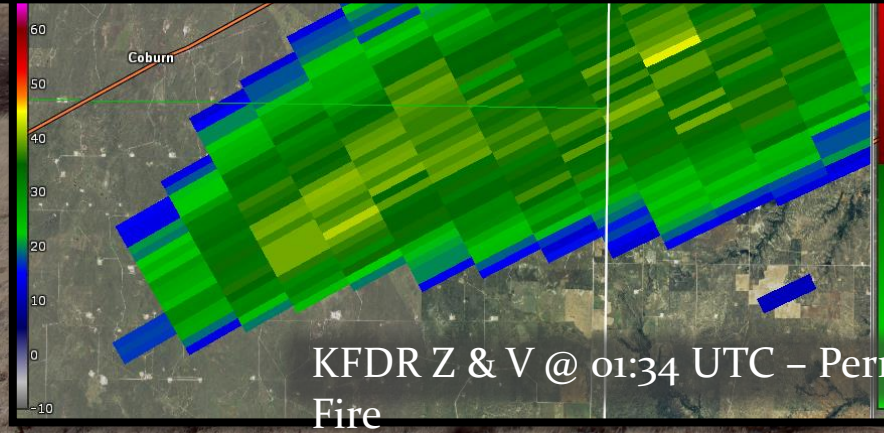
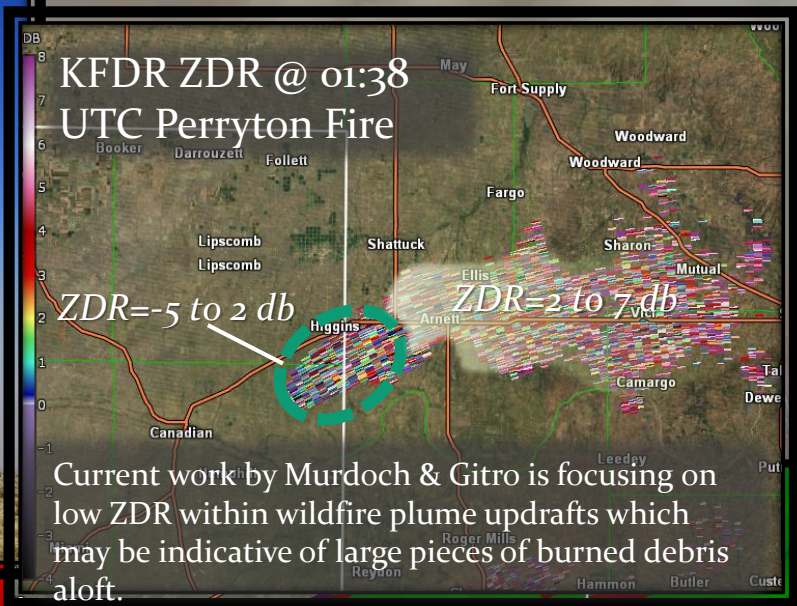
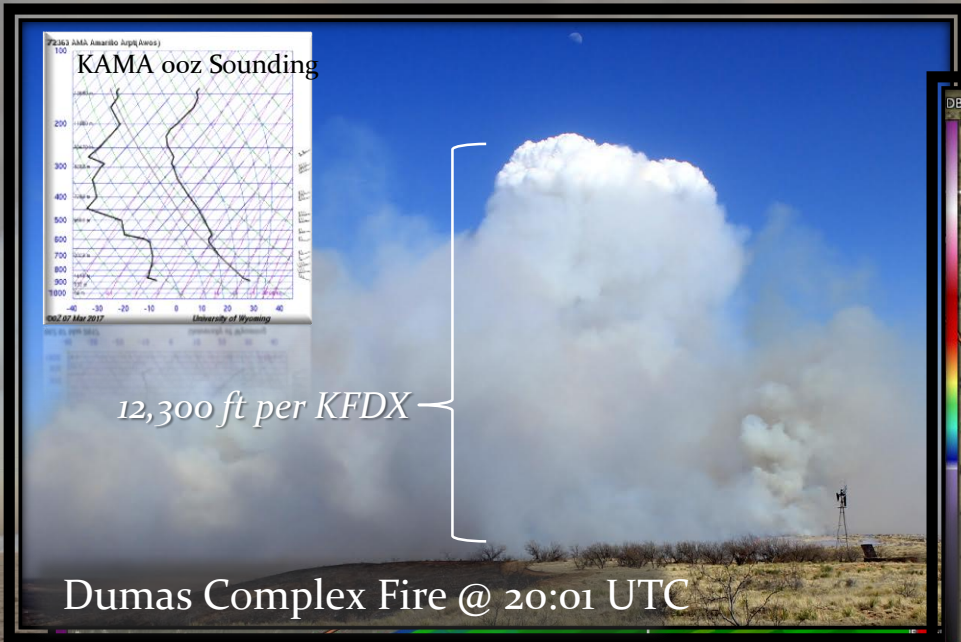
Perryton Fire 3<sup>rd</sup> largest in Texas history.

Previously, only ten megafires had been documented on the southern Great Plains in the modern era.

Anecdotal evidence suggests that a November 1894 fire in New Mexico & the Texas Panhandle burned 6+ million acres – one of the largest fires to ever burn in North America!

# Pyro-Convection

- In spite of strong wind fields throughout the troposphere, burn intensity on 6 March 2017 supported deep convective updrafts.



# Pyro-Convection ...continued

Further evidence of the volatile fire environment that existed on the southern Great Plains in early March 2017, occurred three days later. On 9 March 2017, an isolated fire near Clarendon spawned a tornado-like vortex. The fire whirl entrapped and severely burned two firefighters.



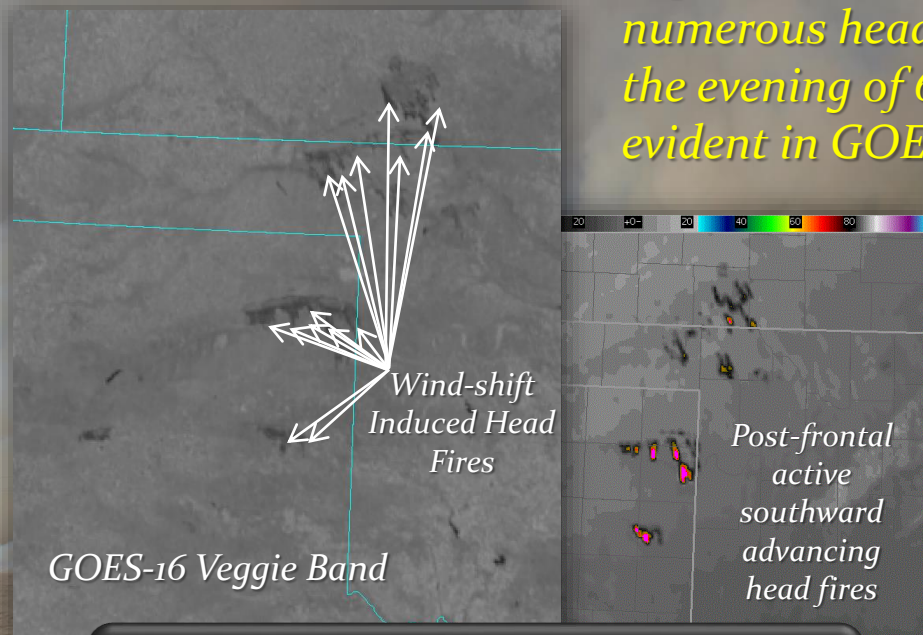
Convective smoke plume in  
GOES-16 - 9 March 2017



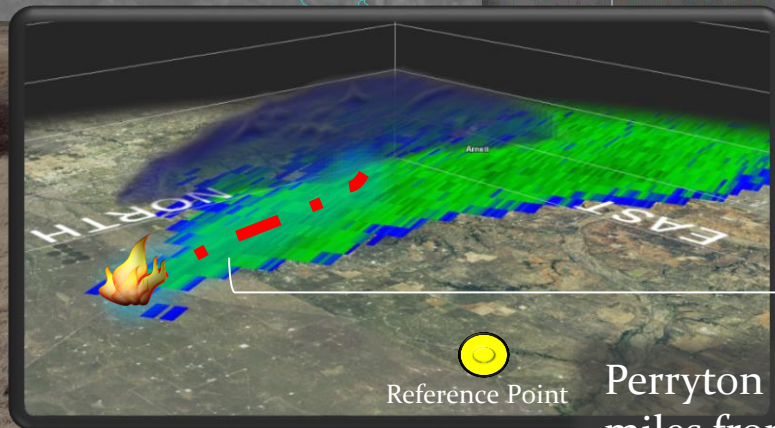
Fire whirl on JA Ranch  
- 9 March 2017

# Wind-Shift on Fire

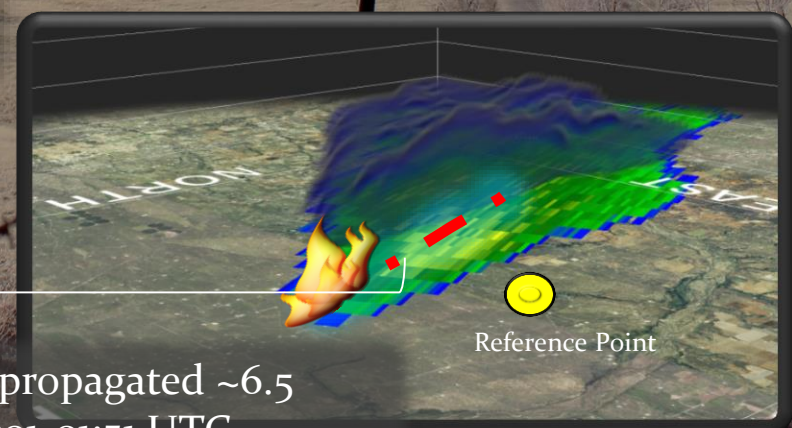
*Expansive west-to-east flank fires transitioned to numerous head fires upon influence of a cold front during the evening of 6 March 2017. The head fires were very evident in GOES-16 imagery.*

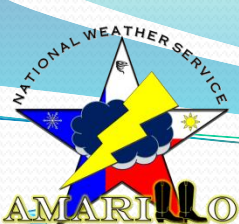


- Flank-to-head fire transition dramatically increases fire size and rates-of-spread.
- Often, fire behavior moderates following frontal passage due to decreased temperatures & higher humidity. However, particularly dry post-frontal air can cause prolonged extreme fire conditions.
- More than 70% of wildland fire fatalities are associated with wind-shifts!



Perryton Fire propagated ~6.5 miles from 01:01-01:51 UTC





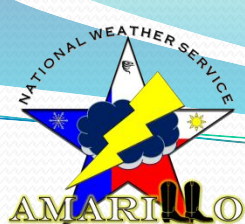
# Decades of Fire?

## Wildland Fire in Southern Great Plains Grasslands Since 2005

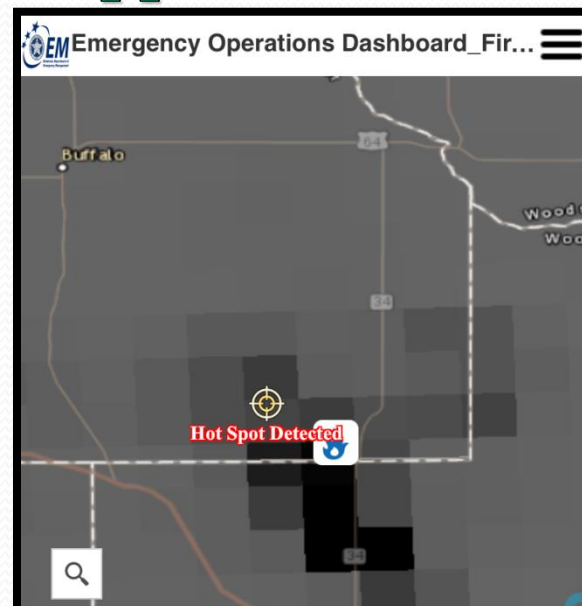
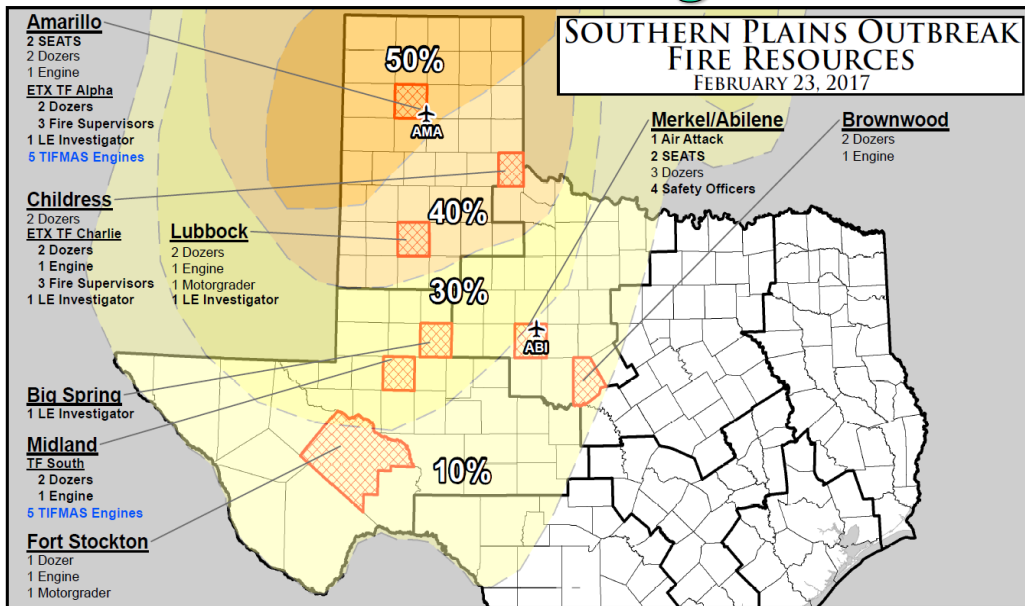


- 25 violent southern Great Plains wildfire outbreaks (SGPWOs) – “Firestorms”
- 5.8 million acres
- 2,661 structures damaged or destroyed
- 34 killed, 221 injured





# Strategic & Tactical Support



**LEGEND**

**Wildfire Risk**

- 10 - 30% - Low Threat of Significant Fire
- 40 - 60% - Moderate Threat of Significant Fire
- >60% - High Threat of Wildfire Outbreak

**Resources**

- BOLD** - TFS Resources moved into region
- Blue** - TIFMAS Resources





# THANK YOU!

